



HYDRO GEO. CHEM, INC.

Groundwater Consultants

Confidential Claim Retracted

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748 N. Country Club
Tucson, Arizona 85716
(602) 326-7020

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MEMO TO: Ron Solimon, Pueblo of Laguna
Pat Wise, Pueblo of Laguna
Frank Jones, Bureau of Indian Affairs
Marc Nelson, U. S. Geological Survey

FROM: Hydro Geo Chem, Inc.

SUBJECT: Progress of work on Laguna Reservation; January 1981.

Hydrogeology. A visit to Albuquerque, Santa Fe, and the Reservation was made during the first two weeks of January. The discharge areas of the Morrison were investigated, with special attention paid to Encinal Canyon, the Rio Pagate-Arroyo Conchos valley, the Rio Puerco Fault Belt, and the Canon Piojo-Salado Canyon area.

Encinal Canyon is a discharge area for the Dakota (6170 feet) and for the Jackpile (about 6100 feet) aquifers. The Rio Pagate, at about 5770-5760 feet, has a seep, apparently at the base of the Westwater; and Arroyo Conchos has a spring in the Bluff at about the same elevation.

Springs on Mesa Gigante were looked at; their high elevation or their low conductivities indicate that water there is separated from the rest of the Jurassic system. This area will not be included in the computer simulations.

The area around Cañon Piojo and Salado Canyon was fenced and locked. It could not be ascertained who owned the land so those springs could not be visited. It was later found out that Kerr-McGee owns the land and had not investigated the springs themselves. We are still awaiting permission to visit the area.

A potentiometric surface map was drawn for the Jackpile aquifer, in the area southeast of the National Forest and the Mesa Chivato. There appears to be a common water level between the Jackpile and the Dakota in many places. In other areas the formations may be separated by a diabase sill, or the lenticularity of the beds may cause seeps and springs at different elevations in outcrops (Encinal Canyon).

South and west of Pagate the Jackpile and Westwater aquifers also appear to have common water levels; to the north and east, the Jackpile has a higher water level, with a maximum head difference of about 160 feet near Marquez. Farther north and east, both formations discharge into a tributary of the Jemez River.



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Transmissivity distributions in the Jackpile appear to be rather random ranging from 6 to 45 feet²/day. It is related mainly to bed thickness which varies from 0 to over 150 feet.

Geology. Four days were spent in Socorro and on the Reservation. At Socorro, the preliminary geologic report was discussed with Clay Smith (New Mexico Bureau of Mines) and well logs were obtained from their library. The Cretaceous stratigraphy was discussed with Steve Hook of New Mexico Tech., and one day was spent on the reservation observing and discussing the Mancos-Dakota interval. Additional well logs were obtained from the Laguna tribal office.

The remainder of the month was spent analyzing the logs, picking formation boundaries, and pertinent structural features. The geologic map of the basin boundaries was completed and is now being drafted. Work was begun on isopach and structural contour maps of the Westwater Canyon Formation, and the Dakota-Jackpile (combined) formations. Geologic maps of the combined San Rafael group and the Mancos Formation will be the last done.

Numerical modeling. Previous attempts to model the effects of mine dewatering on the Morrison aquifers have indicated that under all development scenarios, drawdown occurs throughout the San Juan Basin south of the San Juan River (Guyton, 1978; SJBRUS Working Paper #37, 1979). They imply that impacts will be felt on the Laguna Reservation. To model these effects will require extending the model boundaries well to the north and west of those originally proposed.

In order to deal with the expanded area, a 6-layer model is being designed. It will have a relatively fine mesh (1-mile node spacing) near the Pueblo and major pumping centers, but a very coarse mesh elsewhere. The 6 layers, in ascending order, are San Rafael Group, Recapture Member, Westwater Canyon Member, Brushy Basin Member, Dakota plus Jackpile sandstones, and the Mancos Shale.

Much of the effort in January has been devoted to better understanding the hydrologic boundary conditions between the Rio San Jose and the Nacimiento Uplift. The boundaries of the Morrison outcrops between the Rio San Jose and Mesa Gigante have been defined, but the area northeast of this, within the Rio Puerco Fault Zone, still remains a problem.

Geochemistry. Trilinear (Piper) diagrams were drawn for the Morrison, Dakota, San Rafael, Permian, and Gallup formations, and the alluvial aquifers. They are being used now in interpretation of mixing due to vertical movement between aquifers.

Time-variant parameters were plotted in the Rio Paguete, both up- and down-stream of the Jackpile mine. Similar work is being done on

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the Rio San Jose, though there are few data in this area. There has been no long term sampling of any groundwater.

Main areas of mining and milling pollution have been identified and are being catagorized by surface or groundwater pollution, point, line, or diffuse sources, and pollutant type.